Interaction between Energy Planning and Spatial Planning: Environmental Assessment as a Medium

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Content

Abstract

Focus on climate change, environmental impacts and security of supply of energy has made energy a prominent aspect of the political agenda. Planning of energy aspects is carried out by a variety of actors in the energy sector, but many energy aspects are by nature spatially related and therefore related to spatial planning. This paper presents the interaction between energy and spatial planning and put light on value conflicts and synergies between the two types of planning. Not only is energy emerging as a central theme in spatial planning - spatial planning is also of increased importance in energy planning!

Environmental assessments are argued to be tools to mediate and balance values in this interaction. Focus is on strategic environmental assessment (SEA) and the potential of the tool is discussed with point of departure in a Danish context. Environmental assessment legislation promotes public discussion through hearings of planning proposals and values are thereby implicitly or explicitly debated. SEA on energy planning without spatial references is not required by legislation and the potential of SEA on these plans are discussed.

This paper is part of a PhD project on strategic environmental assessment in the Danish energy sector. The paper is part of a clarification of what plans and programmes that - according to the EU directive and Danish legislation - are subject to SEA processes.

Note: This paper is a development of the submitted abstract "Impacts of Strategic Environmental Assessment on the Planning of Energy Infrastructure in Denmark".

1 Interaction between energy planning and spatial planning

In this paper focus is on the interplay between energy planning defined as the process of developing a framework for regulation in the energy sector and spatial planning defined as the process of distributing people and activities in spaces of various scales.

Energy planning and spatial planning are carried out in two distinct institutional setups, formed by two distinct kinds of planning with difference in the nature of object, planning, and main interests. Characteristics of energy planning and spatial planning are exemplified with a Danish context in the following table. Based on these fundamental differences it seems reasonable to talk about two distinct types of planning.

	Energy planning	**Spatial planning**
Definition	Framework for regulations in the energy sector	Distribution of people and activities in spaces of various scales
Nature of planning	'Optimisation' on models and systems. Technical and economical basis for government's priorities on technologies and infrastructure.	'Consensus/collaboration' Involvement of actors/authorities. Controlling actors' behaviour
Main interest	Security of supply, a well functioning market, and reducing negative impacts on the environment	Satisfied actors, avoidance of future conflicts, balancing local and national interests
Actors	Public authorities and private companies	Public authorities, consultants and citizens

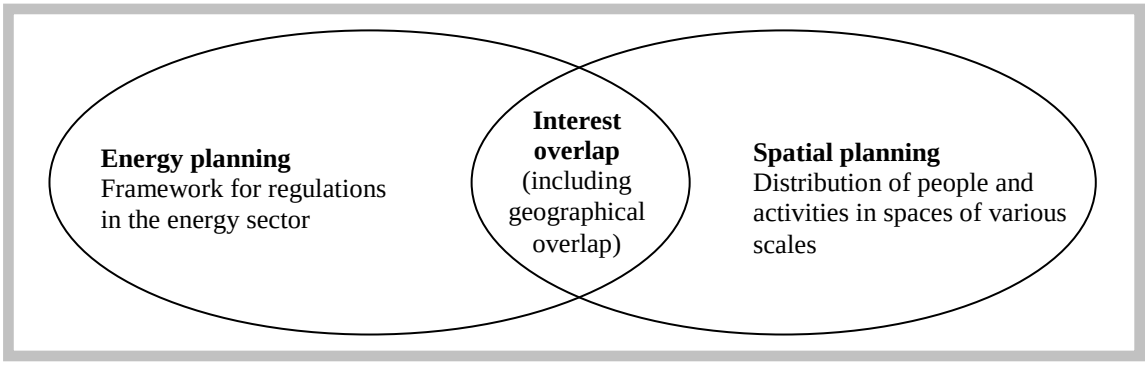
It may be debated whether the sketched energy planning is 'planning' or working documents on development options, however, energy planning includes some regular plan documents with intended actions to achieve specific goals. An example is the annual natural gas security of supply plan, which includes short- and long term goals and steps to fulfil these. Furthermore, deregulation of the energy sector - especially in EU - has reduced the role of energy planning. Challenges like resource scarcity and climate change seem, however, to give back an important role to energy planning.

In spite of the differences between the two types of planning, the interaction between spatial planning and energy planning is considerable:

- Energy planning is part of spatial planning in the spatial coordination of interests and activities, where energy is one aspect.
- Spatial planning is part of energy planning in the consideration of amount and accessibility of areas for production and transport of energy.

Wind power is an example of this interaction: National targets on on-shore wind energy production in Denmark were balanced with what was reckoned to be acceptable and achievable within spatial planning in the municipalities. There was no interest of making a national top-down planning on placement of the wind farms and the targets were therefore balanced with interests in the municipalities. The municipalities were afterwards pressured by the government to integrate wind power equivalent to the targets in their spatial planning. Spatial limitations therefore influence energy targets and targets on energy influences spatial planning.

It is thus possible to talk about an overlap between energy and spatial planning, and this overlap is both about common interests and a geographical overlap.



The interest overlap is significant and includes issues like climate change, energy use, health and landscape. The overlap on these issues has both a positive potential on coordination and negative potential in terms of conflicts. An example of a positive potential is cooperation on reducing the need for energy demand in areas that are difficult to supply and thereby fulfil the interests of both types of planning. Health may give conflicts as health risks are an inherent aspect in transporting energy, e.g. magnetic fields or risk of explosion. Energy needs to be supplied to everyone, but risk of the transport of energy is not wanted. This contradiction may indicate a fundamental paradox in the interaction between the two types of planning: Energy production and transport are societal interests whereas spatial aspects of energy are mainly related to local interests.

Geographical overlap is a certain kind of interest overlap characterised by mutual interest in the same geographical area. Geographical overlap includes areas for production of energy and areas for routing of energy infrastructures. This geographical overlap has manifested itself in tense value conflicts between NGOs, affected citizens, energy companies, and authorities. Examples are discussions of 'using food for oil' in which the use of food products for biofuel is criticised, weighing between landscape and on-shore wind energy, risk taking in terms of carbon storage, etc. How much disturbance of landscapes do we accept for production of wind energy? Energy infrastructure development includes a discussion on beauty versus efficiency as these two aspects seldom harmonize. An example is interests in keeping a beautiful landscape by making all power lines underground with less efficient cables.

1.1 Planning the interaction between space and energy

With two distinct types of planning with separate agendas, there is no assigned responsibility for taking care of the interaction between space and energy. Therefore, conflicts are latent and smouldering, and synergies are unexploited.

Some energy aspects are in Denmark coordinated with other interest through municipal planning and in the government's statement of interests in the municipal planning. The municipal plans determine where to locate energy production units and influence where to place energy grids. Municipalities are furthermore in a process of getting more active in designing their energy supply in the light of the climate change focus.

Consideration of energy aspects in spatial planning at municipal level is, however, late in the decision-making process as many decisions are made prior to this level. Political decisions on technology and targets, and national planning on infrastructure and technology relate to spatial aspects and values. Discussion of values and interest in the interaction between energy and space at this level is very limited. This may be one of the reasons for a strong local opposition

on all energy infrastructures. A similar conclusion and reasoning is found in the Netherlands on infrastructure planning (Stolte 2009).

In this paper environmental assessments are argued to be relevant tools for working with the interaction between energy and space including discussion of values at an earlier stage in decision-making processes. A Danish context is presented in the following as a basis for discussion of potentials. Focus is on environmental assessments in energy planning, but environmental assessments in the spatial planning are just as important means to approach the interaction between space and energy. Contrary to the spatial planning, energy planning has only few experiences on conducting strategic environmental assessments, and therefore interesting to investigate in terms of potentials.

2 Strategic environmental assessment in the energy sector

Environmental assessments are a comprehensive family of assessments that often is seen to include biodiversity assessment, life-cycle assessments, sustainability appraisals, strategic environmental assessments, and many other similar tools. Two widely used types of assessments are Environmental Impact Assessment (EIA) and Strategic Environmental Assessments (SEA). These assessments are partly standardised by EU directives and UNECE Espoo convention and Kiev protocol.

2.1 Environmental assessments in EU directives

With inspiration in American legislation on environmental assessment, the European community has developed directives on environmental assessment since the 70ies. EIA was introduced (1985) with focus on specific projects and after realising a need for a strategic tool, SEA was introduced (2001) on plans and programmes. Environmental assessments are described as the preparation of an environmental report, the carrying out of consultations, the taking into account of the environmental report and the results of the consultations in decision-making and the provision of information on the decision. Both directives are procedural regulations and in practice these procedures take at least three months.

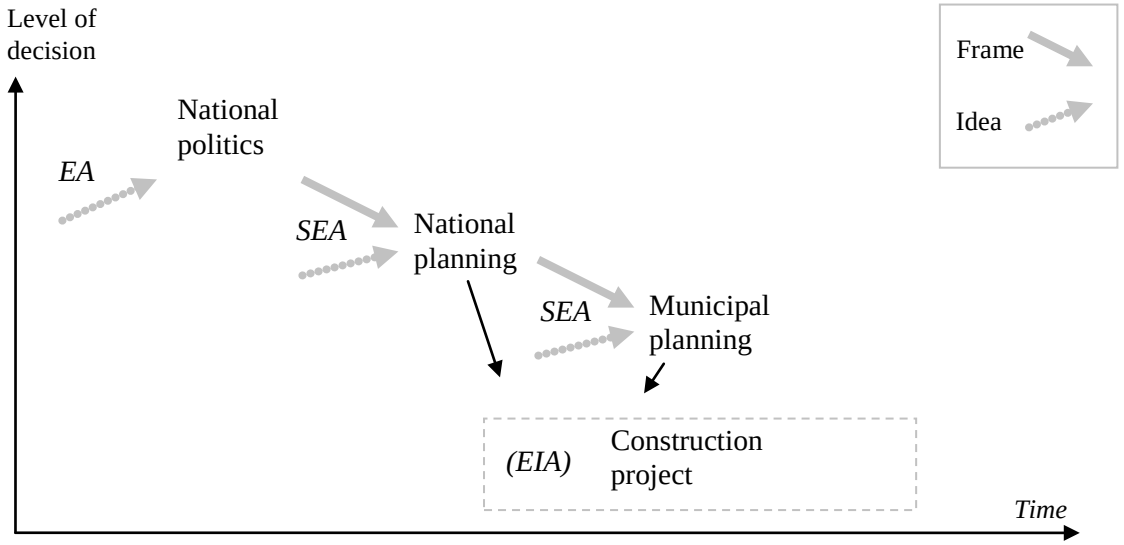
Environmental assessments are supposed to be conducted at all levels from strategic and transnational planning to national and local plans to specific projects. By tiering the assessments, a process that promotes sustainable development throughout the system is set up.

Compared to EIA, SEA is generally less detailed in impact prediction and has a lower level of quantified impacts in analyses than EIA. Moreover, SEA is applied on a high level of abstraction of strategic decision-making that makes impact prediction highly uncertain. Furthermore, the early and strategic decisions may be temporary and redone, and it may therefore be useless in terms of participation and resources to go through a quite demanding process like the directive SEA. Besides, authorities in competition may find it constraining in terms of their room of manoeuvre to make their strategies public. These characteristics lead to other challenges in SEA than EIA, e.g. less objectivity in the assessment. (Jiliberto 2004)

Little work has been done on SEA in the energy sector. A notable exception is the Swedish work (Finnveden et al. 2003, Nilsson 2005) and a working group within Cigré (Du Fouri and Jay 2008, Havenga 2008). SEA has on the other hand for a long time been debated in terms of transport infrastructure (e.g. Chadwick 1996, Niekerk and Voogd 1999, Arce and Gullón 2000)

2.2 SEA and energy plans and programs in Denmark

Planning levels in the interplay between energy and spatial planning in Denmark is sketched in the following figure. Frames from superior planning and inputs of various characters are point of departure for planning at different levels. Environmental assessments are ideally part of the process of forming the planning at every level and play a role in tiering considerations and targets between the levels of planning. Construction projects are framed by planning at national level and/or municipal spatial planning.



Overlap (space and energy)	Subject to SEA (directive)	Examples in Denmark
Location of certain energy production units	√	SEA of placement of off-shore wind parks
Infrastructure for transport of energy	√	Upcoming SEA on natural gas infrastructure planning
Energy demand	-	-
Energy technologies	(-)	EA of government strategy
Energy storage	√	(Expecting a future SEA on CCS)
Location of energy production units (municipal level)	√	SEA on placement of wind parks
District heating (municipal level)	(√)	(None)

As seen from the figure above, the overlap between energy planning and spatial planning is partly covered by the EU directive on SEA and some SEAs have been conducted in Denmark. The directive does, however, not cover plans and programmes without spatial references (frames for development consent), which is further discussed below. Energy policies are in Denmark subject to environmental assessments due to Danish legislation, but few comprehensive assessments have been made. An exemption within the energy sector is the governmental strategy “Energi 21”.

Municipal district heating planning is a type of planning required by the Danish law on heat supply made to promote district heating. District heat systems can be placed in the intersection as a geo-analytical exercise considering spatial aspects like distribution of people in spaces and energy aspects as energy loss. Municipal district heating planning is therefore an interesting type of planning to consider. The Danish law is, however, changed so that planning of district heating is deregulated so that public plans are neither required nor legally binding (Jonassen 2003) and therefore not subject to SEA.

Energy infrastructure is an obvious arena for value conflicts as infrastructure is a societal good with local negative impacts. Planning of energy infrastructure and thoughts on the role of SEA in this regard in Danish TSO Energinet.dk is described in the following.

SEA and energy infrastructure planning in the Danish TSO Energinet.dk

The Danish system transmission operator, Energinet.dk, is currently considering obligations and benefits on SEA as a means to improve strategic decisions. A complicated institutional setup with shared responsibility with the national energy agency for planning and development of infrastructure makes it difficult to clarify what documents are mandatory for SEA procedures. Design and choices of projects early in the decision-making process has widely been based on economic and technical considerations, but the implementation of SEA is intended to give environmental considerations equal status. Thereby, infrastructure planning is intended to move towards a pro-active approach in terms of environmental aspects.

Energy planning at Energinet.dk includes design and routing of infrastructure for energy transport and development of infrastructure for energy storage. With a wide range of plans for altering and expanding the existing electricity grid and gas system, environmental assessments are very relevant. Planning of infrastructure includes considerations of energy production potentials and development within energy consumption and assumptions made on these aspects are directly related to spatial planning as described above. The interaction between spatial planning and energy planning thus also seems to be of increased importance for Energinet.dk.

Early experience on SEA in Energinet.dk show that implementation of SEA may influence the publication of planning as it is part of a restructuring of publication on strategic planning: Rather than making an SEA of biannual plan documents, Energinet.dk has intensions of making SEA prior to specific decisions on infrastructure based on the premise that specific decisions are made continuously and not only in the mentioned plans. This concretization seems to promote transparency and may increase societal awareness of strategic initiatives. On the other hand, the concretisation also reduces flexibility and room for manoeuvre in a fluent and complex development in the energy sector. It is questioned whether application of a several month SEA procedure is possible in a planning process characterised by continuous changes and unpredictability (Lyhne 2009).

The prescribed systematic methodology in SEA also forces planners to consider aspects that are not within their routines and norms, and it urges planners to consider environmental aspects earlier in the planning process. The work on SEA on gas infrastructure in Energinet.dk indicates that more resources are used on environmental considerations earlier than before. Thereby, energy planning is likely to become an improved environmental basis for decision-making.

As implementation of SEA promotes new planning documents, it also provides an opportunity to improve participation in the strategic planning. Strategic decision-making processes have been quite closed for the public and one-way communication, but requirements on hearing in SEA legislation may show to be a beneficial forum for debate and interaction. It is, however, questioned whether a forum at a strategic level will reduce NIMBY-protests at project level, since locals may not engage in strategic discussions or the discussions may not end up with acceptable solutions and understanding.

3 Discussion: SEA as a medium in the interaction

With systematic procedures and public hearings, SEA is likely to be a relevant tool in taking care of the interaction between energy planning and spatial planning. SEA procedures give possibilities for bringing conflicts and synergies forward at a strategic level, where there is a possibility for thinking such issues into decisions on the framework for activities within the energy sector. Actors - including spatial planners - are urged to be involved in planning the framework for production, transport and consumption of energy, and discussions on the overlap between space and energy are therefore clear-cut. SEA thus provides a formalised arena for these discussions between otherwise separated actors. These discussions are likely to provide improved opportunities for energy efficiency, reduced energy consumption and the development of alternative energy production.

As with other tools, SEA put up requirements for resources and interests on actors: Actors need to be willing to discuss aspects with a certain openness to other actors' interests; some actors need to use resources on the assessments; Participants must have some social and strategic intellectual skills, etc. As SEA processes are required by legislation, resources will be found; rather, it is a matter of assigning sufficient resources to gain the benefits of the processes.

SEA also constitutes a medium for balancing efforts with a methodology that helps involved actors not to over-emphasise specific issues like energy and climate. The weighing between environmental and social aspects is made more solid by involvement of a range of actors. Furthermore, SEA is a medium for discussion on the weighing between societal interests in energy activities and local interests among the affected residents.

Although the overlap of interests between spatial planning and energy planning may be approached by SEA, application of the tool in the two types of planning includes a risk of overlap in itself as SEAs applied in energy planning and SEAs applied in spatial planning may approach the same issues. On the other hand, this double approach to the overlap may give continuity in the work on the interaction and increased commitment from the two types of planning.

Focusing on a sector like the energy sector it is obvious that the use of SEA as a medium is narrowed by the spatial bounding in the criteria of what plans and programmes that are covered by the EU directive. The need and benefit of widening the legislation to plans and programmes without spatial references is discussed in the following.

3.1 Widening SEA to plans and programmes without spatial references

In many countries, legislation is based on the EU Directive 2001/42/EC or the UNECE Kiev Protocol (2003), which represents a particular form of SEA in the sense that it is spatially bounded. Article 10 and 11 in the directive and article 4 in the protocol frame the types of plans and programmes that as a rule shall be made subject to SEA. These plans are either spatially decided by the formulation "which set a framework for future development consent" or by expectation on causing an impact to natural habitat areas. Plan or programmes that do not set a frame are not included.

Plans and programmes with an impact on the environment, but no direct spatial reference are highly relevant to assess. These plans could include decisions on support to specific technologies or choices of technologies without no frames for development consent, e.g. use of nanotechnology, GMO, technologies for transport and storage of energy, etc.

EU member states have the opportunity to strengthen the formulations in the implementation of the directive on this subject, but this is not widely done. Authorities may apply SEA on non-spatial plans and programmes, but without legal requirements such efforts may be faced with opposition from the concerned stakeholders. With focus on efficiency in the public sector and

budget constraints citizens may even question the validity of spending resources on not required assessment tools.

Although the spatial reference is a relatively easy criterion for narrowing the plans and programmes covered by legislation, there is a need to reconsider this criterion to make SEA a wider applied tool in sector planning.

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